

CLAIMS:

1. A container stopper including a body of compressible material having at least one end for insertion into an opening of a container, and
5 a film coating on at least part of said end of the body of compressible material for providing a protective barrier between the compressible material and the contents of the container, wherein the end of the stopper body has an uneven shaped axially facing surface.

2. A container stopper according to claim 1 wherein the end
10 surface of the stopper body includes at least one protrusion.

3. A container surface according to claim 1 wherein the end surface of the stopper body includes at least one recess.

4. A container stopper according to claim 1 wherein the end surface of the stopper body includes at least one recess and at least one
15 protrusion.

5. A container stopper according to claim 3 or 4 wherein the end includes a plurality of recesses.

6. A container stopper according to any one of claims 3 to 5 wherein the recess(es) are selected from the group consisting of dimples, depressions, grooves, slots, channels and indentations.
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7. A container stopper according to claim 6 wherein the recesses are indentations.

8. A container stopper according to claim 7 wherein the indentations are cubic, cuboid, truncated cuboid, tetrahedral, truncated
25 tetrahedral, pyramidal, truncated pyramidal, frusto-pyramidal, cylindrical, truncated cylindrical, conical, truncated conical or frusto-conical in shape.

9. A container stopper according to claim 6 wherein the recesses are concentric grooves, slots or channels.

10. The container stopper according to claim 9 wherein the
30 concentric recesses are of a size and spacing to form a concentric corrugation on the stopper end.

11. A container stopper according claim 6 wherein the recesses are selected from the group consisting of grooves, slots and channels, said recesses extending across at least a portion of the end of the stopper.

12. A container stopper according to claim 11 wherein the
5 recesses extend across the entirety of the end of the stopper.

13. A container stopper according to claim 1 wherein the end of the stopper is corrugated, castellated or has a sawtooth profile.

14. A container stopper according to claim 11 or 12 wherein a first set of recesses extend in one direction and a second set of recesses extend
10 in a second direction such that each of the recesses in the first set intersect with one or more of the recesses in the second set.

15. A container stopper according to claim 5 wherein the stopper is substantially cylindrical, the end including an outer region that extends radially inwardly from an outermost periphery of the stopper end, said outer
15 region enclosing an inner region, the recesses in the outer region being different to the recesses in the inner region.

16. A container stopper according to claim 15 wherein the recesses in the outer region are grooves, slots or channels and the recesses in the inner region are indentations.

20 17. A container stopper according to claim 15 wherein the recesses in the outer region are grooves, slots or channels that extend radially inwardly from the outermost periphery of the stopper end and the recesses in the inner region are concentric grooves, slots or channels.

25 18. A container stopper according to claim 2 wherein the end includes a plurality of protrusions.

30 19. A container stopper according to claim 18 wherein the protrusions are projections, said projections being cubic, cuboid, truncated cuboid, tetrahedral, truncated tetrahedral, pyramidal, truncated pyramidal, frusto-pyramidal, cylindrical, truncated cylindrical, conical, truncated conical or frusto-conical in shape

20. A container stopper according to claim 1 wherein the end of the stopper body includes a step or shoulder region at a periphery thereof and a substantially centrally located protrusion.

21. A container stopper according to claim 20, wherein the shoulder region of the stopper extends radially inwardly from an outermost periphery of the stopper end.

22. A container stopper according to claim 21, wherein the radial extent of the shoulder region is substantially perpendicular to a longitudinal axis of the stopper.

23. A container stopper according to claim 22, wherein the stopper body is generally cylindrical, and the step or shoulder region is generally annular and encircles the central protrusion.

24. A container stopper according to any one of claims 20 to 23, wherein the central protrusion has a generally cylindrical or frusto-conical form..

25. A container stopper according to any one of claims 20 to 24, wherein the central protrusion is partly recessed into the shoulder region such that a recess or groove in the shoulder region surrounds a base of the protrusion.

26. A container stopper according to any one of claims 20 to 25, wherein the film coating is provided on the outer surface of the centrally located protrusion.

27. A container stopper according to any one of claims 20 to 26, wherein the film coating substantially entirely covers the endmost surface of the centrally located protrusion only.

28. A container stopper according to any one of claims 20 to 26 wherein the film coating substantially entirely covers the outer surface of the centrally located protrusion, including the side surfaces thereof.

29. A container stopper according to claim 28, wherein the film coating also covers at least a portion of the step or shoulder region.

30. A container stopper according to any one of claims 20 to 29, wherein the container stopper includes a region of foamed material provided at the end of the stopper body.

31. A container stopper according to claim 30, wherein the
5 foamed material is provided at the step or shoulder region.

32. A container stopper according to any one of claims 20 to 31, wherein the area of the step or shoulder region is more than 10% of the total surface area of the end of the stopper body (which includes the shoulder region).

33. A container stopper according to any one of claims 1 to 32,
10 wherein the film is a polymeric film and includes multiple layers including at least one barrier layer and at least one adhesive layer.

34. A container stopper according to claim 33, wherein the at least one barrier layer includes a polymer selected from the group consisting of: BOPP, polyacrylonitrile, polychlorotrifluoroethylene (PCTFE), polyethylene,
15 polypropylene, polyethylene terephthalate, polyvinyl chloride, polydivinyl chloride, polyvinyl dichloride, polyvinylidene chloride (PVDC), polyvinyl acetate, ethylene-vinyl acetate, ethylene-vinyl alcohol (EVOH), polyvinyl alcohol (PVOH), nylon, polycarbonates, polystyrene, polyalkylene oxide polymers, and any possible copolymers of any of the foregoing.

20 35. A container stopper according to any one of claims 1 to 34, wherein the compressible material of the stopper is selected from the group consisting of: natural cork, agglomerated cork and micro-agglomerated cork.

36. A container stopper including a body of compressible material having at least one end for insertion into an opening of a container, and
25 a film coating on at least part of said end of the body of compressible material for providing a protective barrier between the compressible material and the contents of the container, wherein the end of the stopper body includes region of foamed material.

37. A container stopper according to claim 36, wherein the
30 foamed material is a closed-cell type foamed polymer.

38. A container stopper according to claim 36 or claim 37, wherein the end of the stopper body tapers towards an endmost surface of the stopper and the foamed material is provided in the region of taper.

39. A container stopper according to claim 37 or claim 38,
5 wherein a peripheral edge region at the end of the stopper is tapered or chamfered and the foamed material is located at the peripheral edge region.

40. A container stopper according to any one of claims 37 to 38, wherein the end of the stopper body includes a step or shoulder region at a peripheral edge region thereof and the foamed material is provided in the
10 shoulder region.

41. A container stopper according to any one of claims 36 to 39, wherein the end of the stopper body includes a substantially centrally located protrusion.

42. A container stopper according to claim 40, wherein the
15 shoulder region of the stopper extends radially inwardly from the outer periphery of the stopper end, with the radial extent of the shoulder region being substantially perpendicular to a longitudinal axis of the stopper.

43. A container stopper according to claim 42, wherein the
20 central protrusion has a generally cylindrical or frusto-conical form with a substantially planar endmost surface.

44. A container stopper according to claim 43, wherein the central protrusion is partly recessed into the shoulder region such that a recess or groove in the shoulder region surrounds a base of the protrusion.

45. A packaged product including a liquid in a container, the
25 container including a container stopper according to any one of claims 1 to 44, the container stopper being received in an opening of the container in an interference fit to thereby seal the container opening.

46. A packaged product according to claim 45, wherein the
30 container is a bottle, and wherein the container stopper is received in an opening formed in a neck of the bottle.

47. A method of producing a container stopper the method including the steps of

(a) providing a container stopper, said stopper having a body of compressible material having at least one end, said end presenting a surface;

5 (b) providing a film,

(c) heating the film,

(d) pressing the film and the surface relatively together so as to attach the film to the surface,

10 (e) pressing the product of step (d) with a cooling plate, the cooling plate being shaped in such a manner to introduce protrusions, recesses or a combination thereof onto the end of the stopper after cooling, wherein step (c) occurs either prior to or simultaneously with step (d).

48. A method according to claim 47 wherein the cooling plate includes a number of protrusions to produce a stopper containing a number of
15 recesses in the end.

49. A method according to claim 47 wherein the film is heated to a temperature greater than the softening, melting or activation temperature of the outer layer of the polymeric film.

50. A method according to claim 47 wherein during step (d) the
20 pressing is sufficient to compress the stopper by at least 0.2% in the axial direction.

51. A method according to claim 47 wherein during step (d) the pressing is sufficient to compress the stopper by at least 5% in the axial direction.

52. A method according to claim 47 wherein the pressing
25 continues for a period of from 0.1 to 5 seconds.